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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/782,538	02/18/2004	Jennifer Wang	P1573	3232

7590 11/14/2005

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EXAMINER	
VINH, LAN	

ART UNIT	PAPER NUMBER
1765	

DATE MAILED: 11/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/782,538	WANG, JENNIFER	
	Examiner	Art Unit	
	Lan Vinh	1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 February 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,9-17, 19-20* is/are rejected.

7)☒ Claim(s) *8 and 18* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 9-11, 20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 9-11, 20 are indefinite for the use of improper Markush language, the examiner suggests replacing " selected from a group" with --selected from the group--

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 7, 9-11, 12, 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Charles (US 6,289,030)

Charles discloses a method for fabricating of semiconductor devices on a semiconductor wafer. The method comprises the steps of

providing a dry plasma reaction gas mixture methane and hydrogen to etch through the different semiconductor layers (col 5, lines 20-23), which inherently

reads on providing a dry plasma reaction gas mixture being chemically selected for, and having an etch rate corresponding to, each semiconductor material layer

dividing the semiconductor structure into a masked portion and an unmasked portion (col 5, lines 1-5; fig. 2)

sequentially exposing the unmasked portion of the semiconductor structure to the dry plasma reaction gas mixture (col 5, lines 15-20)

The limitation of claim 2 has been discussed above

Regarding claim 3, Charles discloses that the gas mixture comprises 12 sccm of CH4 and 50 sccm of hydrogen (col 5, lines 44-46), which reads on the gas mixture comprises one part of methane and four part of hydrogen

Regarding claim 7, Charles discloses forming silicon dioxide layer 8 and capping layer 7 (col 5, lines 12-15)

Regarding claim 9, Charles discloses exposing the unmasked portion of the semiconductor structure to the plasma gas mixture such that layer 8 acts as an etch stop for the etching of the substrate (fig. 3)

Regarding claims 10-11, Charles discloses forming an InP layer on a semiconductor wafer (col 4, lines 44-51)

Regarding claim 12, Charles is silent about removing the semiconductor wafer from the chamber during etching, which reads on etching the semiconductor material layer in-situ

Regarding claim 17, Charles discloses the step of optimizing the thicknesses of the layer deposited on the vertical sidewall of the semiconductor structure (col 7, lines 60-

65) and etching the semiconductor structure (col 8, lines 40-45), which reads on analyzing the semiconductor structure for determining whether a desired vertical sidewall profile has been achieved and repeating the exposing step to achieve the vertical sidewall

3. Claims 1-2, 4-5, 7, 9-17, 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Shul et al (US 5,624,529)

Shul discloses a dry etching method for compound semiconductors structure, the semiconductor structure comprises an aluminum gallium arsenide layer (col 3, lines 55-60). The method comprises the steps of:

providing a dry plasma reaction gas mixture methane and hydrogen to etch through the different semiconductor layers, the etch rate corresponding to, each semiconductor material layer (col 5, lines 48-51; col 6, lines 25-30)

dividing the semiconductor structure into a masked portion and an unmasked portion (col 3, lines 10-15; fig. 1)

sequentially exposing the unmasked portion of the semiconductor structure to the dry plasma reaction gas mixture (col 6, lines 30-45)

The limitation of claims 2, 7 have been discussed above

Regarding claim 4, Shul discloses adding chlorine to the plasma mixture of methane and hydrogen (col 5, lines 5-7)

Regarding claim 5, Shul discloses that the combine flow rate of methane and hydrogen which is greater than that of chlorine (col 5, lines 5-25)

Regarding claim 9, Shul discloses etching through the layers of the unmasked portion of the semiconductor structure (col 3, lines 61-65)

Regarding claims 10-11, Shul discloses that the semiconductor structure comprises an aluminum gallium arsenide layer (col 3, lines 55-60)

Regarding claim 12, Shul is silent about removing the semiconductor wafer from the chamber during etching, which reads on etching the semiconductor material layer in-situ

Regarding claims 13-15, Shul discloses using a temperature of 10 degree C and a RF bias power range of 0-250 W (col 5, lines 45-66)

Regarding claim 16, Shul discloses using a pressure of 2 mTorr (col 6, lines 47-48)

Regarding claim 17, Shul discloses the step of controlling the gas flow rate to etch the semiconductor structure with smooth surface, the semiconductor structure having vertical sidewall (fig. 1), which reads on analyzing the semiconductor structure for determining whether a desired vertical sidewall profile has been achieved and repeating the exposing step to achieve the vertical sidewall

4. Claim 19 is rejected under 35 U.S.C. 102(b) as being anticipated by Shul et al (US 5,624,529)

Shul discloses a dry etching method for compound semiconductors structure, the semiconductor structure comprises an aluminum gallium arsenide layer (col 3, lines 55-60). The method comprises the steps of:

providing a dry plasma reaction gas mixture methane and hydrogen to etch through the different semiconductor layers, the etch rate corresponding to, each semiconductor material layer (col 5, lines 48-51; col 6, lines 25-30)

dividing the semiconductor structure into a masked portion and an unmasked portion (col 3, lines 10-15; fig. 1)

sequentially exposing the unmasked portion of the semiconductor structure to the dry plasma reaction gas mixture (col 6, lines 30-45)

wherein an initial plasma gas mixture comprises methane and hydrogen (col 4, lines 50-52) and a subsequent plasma gas mixture comprises methane, hydrogen and chlorine (col 6, lines 43-46)

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 3, 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shul et al (US 5,624,529) in view of Demmin et al (US 6,635,185)

Shul method has been described above. Unlike the instant claimed inventions as per claims 3, 6, Shul fails to disclose the specific volume ratio/flow rate of the etchants although Shul discloses that the flow rates of the etchant are important in controlling the etch rate (col 6, lines 22-25)

Demmin, in a method for etching, discloses that plasma operating condition such as flow rate can have an effect on the results obtained (col 7, lines 15-20)

Hence, one skilled in the art at the time the invention was made would have found it obvious to vary the flow rate of the etchant in Shul method to any specific amount because Demmin teaches that changing parameter such as flow rate according to the material being etched appears to reflect a result-effective variable which can be optimize. See MPEP 2144.05 IIB

Allowable Subject Matter

7. Claims 8, 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 571 272 1471. The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571 272 1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

LV
November 9, 2005